Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Surface nanobubble contact angles[1] BRAM BORKENT, Physics of Fluids, Faculty of Science and Technology, University of Twente, SISSI DE BEER, FRIEDER MUGELE, Physics of Complex Fluids, Faculty of Science and Technology, University of Twente, DETLEF LOHSE, Physics of Fluids, Faculty of Science and Technology, University of Twente — Previous AFM experiments on surface nanobubbles have suggested an anomalously large contact angle θ of the bubbles (typically $\sim 160\,^\circ$ measured through the water) and a possible size dependence $\theta(R)$. Here we determine $\theta(R)$ for nanobubbles on smooth highly orientated pyrolytic graphite (HOPG) with a variety of different cantilevers. It is found that $\theta(R)$ is constant within the experimental error, down to bubbles as small as $R = 20\,\mathrm{nm}$, and its value is equal to $119 \pm 4\,^\circ$. This result, which is the lowest contact angle for surface nanobubbles found so far, is very reproducible and independent of the cantilever type used, provided that the cantilever is clean and the HOPG surface is smooth. In contrast we find that, for a particular set of cantilevers, the surface can become relatively rough due to precipitated matter from the cantilever onto the substrate, in which case larger nanoscopic contact angles ($\sim 150\,^\circ$) show up.

[1]this work was financially supported by NanoNed (TMM.6413) & FOM.

Bram Borkent
Physics of Fluids, Faculty of Science and Technology, University of Twente

Date submitted: 05 Aug 2009 Electronic form version 1.4